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# Does retirement age impact mortality?☆

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ABSTRACT

The relationship between retirement and mortality is studied with a unique administrative data set covering the full population of Norway. A series of retirement policy changes in Norway reduced the retirement age for a group of workers but not for others. Difference-in-differences estimation based on monthly birth cohorts and treatment group status show that the early retirement programme significantly reduced the retirement age; this holds true also when we account for programme substitution, for example into the disability pension. Instrumental variables estimation results show no effect on mortality of retirement age; neither do estimation results from a hazard rate model.



## 1. Introduction

Is there a causal link, positive or negative, from retirement age to mortality? Leaving employment may involve reduced stress and greater enjoyment of life, suggesting that early retirement enhances longevity. However, it may also lead to reduced mental and physical activity, loss of social networks, and health-adverse habits, suggesting that later retirement may extend expected lifespan.

Increasing life expectancy, especially at older ages, is imparting a new urgency to this question. Many OECD countries, looking ahead to the burgeoning fiscal burden of social security entitlements, have responded to increasing longevity by raising the statutory pension age; others have announced future increases (OECD, 2011). To the extent that pension access age influences actual retirement age, economic assessment of these policy reforms requires evidence about whether, how, and to what extent such changes affect life expectancy.

While many papers address the relationship between retirement and mortality, the existing literature has thus far not succeeded in providing definitive guidance on its nature. This is primarily because health status influences both the timing of retirement and mortality. While early retirement may influence longevity, poor health may both induce a worker to retire and lead to an earlier death. Controlling for the ensuing selection bias is difficult, and until recently, attempts to do so have been unconvincing. Moreover, data sources vary in their time span and reliability, and data records sometimes do not extend to late ages.

Recently, however, a number of studies have adopted approaches which take seriously the endogeneity of health status and retirement; policy changes such as differential retirement ages by cohort, region or industry have been enlisted as instruments. However, since involuntary retirement may also occur in early retirement programmes, it is important to separate the potential effect of an early retirement programme as such – which should be related to the voluminous literature on the effects of job-loss – from the potential effect of a change in the retirement age. In order

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to isolate the effect of the retirement age on mortality we require exogenous variation in the (entitled) retirement age *conditional on participation in an early retirement programme*, compared with a group facing no such change, to capture time trends.

This paper combines such a research design with a unique administrative data set covering the entire population of Norway from 1992 to 2010. The data include highly reliable information on earnings, pension and labour market status as well as demographic information, such as birth and mortality dates, gender, education, and marital status.

Between 1989 and 1998, Norway progressively introduced an early retirement scheme for some employers, while for others; the official retirement age remained at 67. We use this gradual and differential change in policy to investigate whether the early retirement opportunity generated significant differences in mortality between the groups, using an approach based on instrumental variables (IV) and difference-in-differences. Focusing on the cohorts born between 1928 and 1938 we construct a treatment group for which the *entitled retirement age* (ERA) fell from 65, via 64, 63 and finally to 62 years in 1998, and a control group for which the ERA remained 67 throughout.

From this quasi-natural experiment we first study the impact of the fall in ERA on *actual retirement age*, ARA, defined as the age when a person was last observed working. Importantly, we take into account all forms of programme substitution, since early retirement may serve as a substitute for disability pension and other social insurance programmes. From this first-stage analysis we find, unsurprisingly, that lowering the entitled retirement age clearly and significantly reduces the actual retirement age. The mapping from entitled to actual retirement age is however well below one-to-one.

Secondly, we study the impact of exogenous reductions in retirement age on mortality using the ERA as an instrumental variable for the ARA. Our data records mortality up to age 77 for some cohorts, well above most other studies in this field. We also decompose the data to perform separate analyses by gender, marital status, industry and education. Our instrumental variable estimates consistently fail to reject the null hypothesis of no causal effect of retirement age on mortality, despite a strong first stage and relatively precisely estimated coefficients. We also conduct several robustness and sensitivity tests, including different treatment group ERA-margins (65–64 and 64–62), employer fixed effects, and controls for whether or not the employer downsize (as indications of involuntary job loss), all of which support our main findings. As a final robustness check we estimate a triple difference estimator of the effect of retirement eligibility on mortality in a hazard rate model framework with flexible monthly mortality risk. The results of this exercise are well in line with our main results.

The paper proceeds as follows: Section 2 surveys some related empirical studies of the relationship between retirement age and mortality. Section 3 describes the institutional setting and the data. Section 4 presents the empirical strategy and discusses the identifying assumptions, before the main results are presented in Section 5 together with several tests for robustness. It also presents results from separate estimations on a number of subgroups. Results from the hazard rate model are presented in Section 6. Section 7 concludes.

## 2. Previous literature

The literature relating retirement, health, and mortality is vast and until the last 10 years or so has developed seemingly independently of policy considerations. Shim et al. (2010) undertaking a systematic review of retirement as a risk factor for mortality, identify more than 1100 studies on the topic, but only a small proportion of these survived their filtering processes. They report that the surviving research studies do not allow firm conclusions to be drawn regarding the link between specific categories of retirement and mortality, although they find that "all-type" retirement, which includes health induced retirement, is a risk factor for mortality. They conclude that there is a "critical" need for further research.[1]

Several studies have also recognized the simultaneous influence of health status on retirement and mortality, but to date, have been similarly inconclusive in identifying the nature, if any, of a direct retirement-mortality link. Waldron (2001) defines early retirement as taking benefits at various ages prior to 65, and finds that early retirement among men in the US is associated with higher mortality. He suggests that this may be a manifestation of optimizing behaviour. Hurd and McGarry (2002) find that individuals' subjective survival probabilities roughly predict actual survival. A positive correlation between age of retirement and life expectancy might be expected if individuals are retiring in light of their longevity expectations. On the other hand, some of these studies find no impact of retirement age on longevity (Tsai et al., 2005; Litwin, 2007).

Controlling for health status to avoid the simultaneity bias, Brockmann et al. (2009) report differential effects of early retirement, depending on health status. Among women without reduced earnings capacity, earlier retirement reduces mortality. On the other hand, Quaade et al. (2002) use a similar approach and find mortality among early retirees to be "normal" initially but subsequently increasing. Bamia et al. (2007) base their analysis on a Cox hazard regression approach with controls for various heath conditions, and also find early retirement to be strongly associated with higher mortality.

These results all hinge on the assumption that retirement age is uncorrelated with present or future mortality risk, after controlling in various ways for pre-retirement health status. Selection processes beyond this are discussed, but not modelled.

A recent study based on Norwegian data (Skirbekk et al., 2010) attempts to circumvent the selection problem by including only those who work at age 60, live beyond age 70 and do not receive disability pensions. This approach eliminates biases due to selection into retirement of persons in such bad health that they die before age 70, at the same time as it fails to capture any effect of retirement on mortality prior to this age. They find that early retirement is associated with higher mortality.

Among the studies based on instrumental variables approaches,[2] Coe and Zamarro (2011) use country specific early and normal retirement ages as an instrument for retirement behaviour in a regression discontinuity design. They find a positive association between early retirement and health status, but do not link this directly to mortality. Coe and Lindeboom (2008) use unexpected early retirement window offers to instrument for retirement behaviour and find no effect of early retirement on men's health or mortality, six years after retirement.

Kuhn et al. (2010) rely on an institutional change in Austria that increased access to early retirement in the form of extended duration of unemployment benefits in certain regions. In an IV analysis following blue collar workers up to age 67, they find significantly

[1] Shim et al. (2010) also point out that the term "retirement" is not always used in the same way, leading to further confusion in studies focused on its mortality impact.

[2] The most recent study of which we are aware is a preliminary paper by Bingley and Pedersen (2011). In an instrumental variable approach, they exploit the introduction of an early retirement programme in Denmark. Using population based administrative data on blue collar workers they find that those induced to retire early by the programme have subsequently better health and reduced mortality, both by age 70 and 80.